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Relationships of hardiness to physical and mental health status in military men: a test of mediated effects

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Abstract Evidence links the personality trait hardiness to both mental (MH) and physical health (PH) status, but few unifying models delineate interrelationships of these variables. The first purpose of this study was to examine the association of hardiness to MH and PH in military men. Second, we tested the hypothesis that MH would mediate the association of hardiness with PH. Identical measures were collected in two separate, demographically-similar samples (n = 65 and n = 55). All subjects completed a background questionnaire, the Dispositional Resilience Scale-15 and the Short Form 36 Medical Outcomes Survey. Associations between hardiness, PH and MH were examined using regression-based mediation analyses followed by the Sobel test of indirect effects. In the total sample, hardiness predicted PH in an initial regression model ($\beta = 0.37$, $p < .001$). When MH was added to the model, however, PH's influence was substantially attenuated and no longer significant ($\beta = 0.06$, $p > .05$). A Sobel test of significance confirmed a mediated effect ($p < .001$). Similar patterns were observed in each individual sample. Hardiness is associated with PH in military men, and this relationship is mediated by MH.

Keywords Hardiness · Health · Mediated effects · Mental health · Physical health

Introduction

A substantial literature has evolved across more than 30 years examining the personality trait hardiness (also termed dispositional resilience), characterized by perceived

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control over various aspects of life, commitment to one's endeavors, and a tendency to view stressors as challenges (Kobasa, 1979, 1982; Maddi, 2002, 2007; Maddi et al., 2006). Conceptually, hardiness is broadly characterized as a stable disposition (Maddi, 1999) and/or a pattern of attitudes and skills (Maddi, 2007) providing the courage to turn stressful circumstances into growth opportunities. Over the years, a series of studies has yielded evidence for the construct validity of hardiness, including its interrelated elements of commitment, control and challenge. Commitment describes the tendency to stay involved with people and events rather than retreating into isolation under stress. Control refers to the belief that if one struggles and applies effort, s/he may be able to influence outcomes. Finally, challenge describes the tendency to view change as natural and as an opportunity for growth. Validation studies suggest that this construct is conceptually distinct from other well-known dispositions such as neuroticism (Maddi et al., 2001; Skomorovsky & Sudom, 2011), Type A behavioral pattern (Kobasa et al., 1983), negative affect (Maddi & Khoshaba, 1994), and optimism (Maddi & Hightower, 1999), although this is not strictly uncontested (Heckman & Clay, 2005). An overarching theoretical model delineating complex relationships between hardiness; stress/strain; mental/physical health; and associated causal pathways is proposed in the *Hardiness Model* (see Maddi, 2002, 2007). Accruing evidence supports components of this model in that hardiness buffers relationships between stress and disease (Kobasa, 1979, 1982; Kobasa et al., 1982); likewise, this construct has received attention in both civilian (Kobasa, 1982) and military populations (Bartone, 1999; Waysman et al., 2001) for its protective role against stress and trauma. Despite several studies identifying correlates of hardiness, there are few empirical tests of indirect (mediated) effects underlying relationships of hardiness to mental and physical health status.

In early work Kobasa (1979, 1982), recognized that although substantial research indicates that stressful life events precipitate disease (e.g., Dohrenwend & Dohrenwend, 1974; Gunderson & Rahe, 1974; Rahe, 1974), the majority of observed correlations fall below 0.30 and are based on highly variable data (Rabkin & Struening, 1976). Accordingly, she expressed the importance of examining individual differences governing the observed relationships and, in turn, hypothesized that people who experience high degrees of stress without falling ill may possess a personality structure distinguishable from those who become sick under similar circumstances. In a pivotal study, Kobasa (1979) examined hardiness as a moderator of the effects of stressful life events on illness. In this study, two groups of executives with comparably high degrees of stressful life events over the last 3 years were compared. One group suffered high stress without falling ill, while the other group reported becoming sick after stressful encounters. Discriminant function analyses supported the prediction that the high stress—low illness group possessed more hardiness than their high stress—high illness counterparts. Subsequent laboratory and field-based research complemented these early findings with evidence that the conceptually-related constructs of challenge (Smith et al., 1978), commitment (Antonovsky, 1979) and control (Lefcourt, 1976) buffered the influence of stressful life events on key aspects of health and illness. Kobasa (1982) later strengthened these findings with a longitudinal investigation showing that hardiness mitigates the effect of stressful life events on illness in corporate managers across a 5 year period. More recently, individuals with high blood pressure (quantified as systolic > 140 and diastolic > 80) endorsed lower hardiness than individuals with normal blood pressure (Maddi, 1999). Further, this construct has been linked to enhanced functional immune status (i.e., proliferative responses; Dolbier et al., 2001) in healthy individuals under nonstressful circumstances, although inconsistent results have been achieved when immune status is measured enumeratively (e.g., total T-cell count) and in populations with compromised immune function (Nicholas & Webster, 1993, 1996). Hardiness has also been linked to fewer illness symptoms in corporate (Dolbier et al., 2007), military (Hystad et al., 2011), and blue-collar samples (Bartone, 1989); enhanced medical outcomes in patients with chronic illness (Brooks, 2003); and improved health indices in chronically stressed individuals (DiBartolo & Soeken, 2003) as well as older adults (Smith et al., 2004).

Other work specifically articulates a link between hardiness and *mental* health (Bartone, 1999; Ben-Zur et al., 2005; Dolan & Adler, 2006; Florian et al., 1995; Lambert et al., 2007; Oliver, 2010; Skomorovsky & Sudom, 2011). For example, Florian et al. showed that elements of hardiness (commitment and control) influenced mental health in Israeli recruits undergoing intense combat training, mediated by adaptive appraisal and coping. Also, Bartone (1999) showed that hardiness interacts with combat stress and stressful life events to predict psychiatric as well as general health symptoms in military personnel, while other work has shown that elements of hardiness buffer peritraumatic dissociative (Eid & Morgan, 2006) and emotional responses to military (Eid et al., 2004) as well as law enforcement stress (Andrew et al., 2008). Dolan and Adler (2006) showed that military-specific hardiness partially mediated the impact of deployment stress on mental health, yet did not predict physical health in this sample. Moreover, the hardiness construct correlates positively with active coping (Maddi, 1999) and negatively with avoidant coping (Maddi et al., 2006). A recent meta-analytic review (Oliver, 2010) confirmed associations (with moderate effect sizes) between hardiness and reduced subjective

distress, enhanced well-being, and improved job satisfaction. Hardiness is also negatively related to self-reported indices of strain (Maddi, 1999), a distinct construct reflecting adverse consequences of cumulative stress.

Hardiness, then, associates with aspects of mental health and (often but not always) physical health, with some studies showing concurrent relationships to both endpoints (Kee, 2003; Lambert et al., 2007). Mental health, in turn, is widely known to covary with physical health (Cohen et al., 1998). Limited research, however, examines path processes underlying interrelationships of these variables. In all likelihood, hardiness may influence physical health status via multiple interactive mechanisms (Maddi, 2007), such as subjective distress (Oliver, 2010); anxiety/depression (Drory & Florian, 1991); well-being (Orr & Westman, 1990); coping/appraisal (Florian et al., 1995); burnout (Oliver, 2010); health practices; and/or stress hormone profiles (Epel et al., 1998). Historically, research implies that hardiness may influence health systems via coping (Gentry & Kobasa, 1984), although other evidence suggests direct effects of hardiness on illness (Orr & Westman, 1990). Soderstrom et al. (2000) employed path-analysis modeling to explore relationships between hardiness, coping, perceived stress, and illness symptoms in a corporate and university sample, respectively. In the corporate sample, hardiness, approach coping and avoidant coping influenced illness symptoms, partially mediated via perceived stress. In the university sample, a modified solution specifying an additional direct path from avoidant coping to illness was achieved. Using a similar modeling approach, Steinhardt et al. (2003) showed that hardiness, supervisor support and group cohesion predicted less work stress, which in turn partially mediated the influence of these factors on job satisfaction. In a subsequent effort, McCalister et al. (2006) concluded that hardiness, supervisor support, and coworker support tended to ameliorate—while negative affect tended to exacerbate—occupational stress. As with the previous study, work stress partially mediated the effects of these independent variables on job satisfaction. Although few studies exemplify this modeling approach, empirical tests of indirect (mediated) effects are crucial to advance our understanding of these processes, which in turn enables the evolution and refinement of theory (MacKinnon, 2008). Moreover, since hardiness appears responsive to intervention (Dolbier et al., 2010; Maddi et al., 1998; Steinhardt & Dolbier, 2008; Steinhardt et al., 2009), a precise understanding of these processes is essential to the development of evidence-based methods to build resilience against stressful events (Casey, 2011) and resultant illness (Steinhardt et al., 2009). In light of the previously stated literature gaps, we tested a path-process model of hardiness, MH and PH. Specifically, a central purpose of this study was to examine relationships of hardiness to both MH and PH in military men. A second purpose was to explore the mediating effect of MH in the hardiness—PH relationship. It was hypothesized that hardiness would associate with enhanced MH and PH; it was further expected that MH would mediate the relationship of hardiness to PH.

Methods

Subjects

Detailed subject characteristics for both samples are provided in Table 1. In general, subjects from both samples consisted of relatively young, healthy, male military members who were early in their careers. Sample 1 included 65 male active duty Navy and Marine Corps personnel who had been assigned to pre-deployment survival training in San Diego, CA. All were subjected to medical and psychological screening prior to enrollment in the course. Medical personnel screen students upon arrival for this course, and exclude individuals for endocrine, renal, cardiovascular, psychological, or musculoskeletal disorders. Thus, students deemed medically fit to undergo survival training were also eligible for this study. Survey administration took place on the first day of classroom instruction (5 days prior to any stressful field experiences), and therefore approximates baseline conditions. We subsequently evaluated these subjects prospectively while undergoing survival training; that study is reported elsewhere (Taylor et al., in press). Sample 2 subjects included 55 male active duty Navy and Marine Corps personnel assigned to aviation training at Naval Air Station Pensacola (Florida), but were awaiting assumption of training. Personnel in this status are typically assigned administrative duties until their training course begins. We subsequently evaluated these subjects prospectively while undergoing a mild laboratory stressor; those findings are also published elsewhere (Taylor et al., 2011). For this sample, specific inclusion/exclusion criteria were imposed. Exclusion criteria included excessive alcohol consumption (>3 drinks/day), defective color vision, ocular pathology, and current diagnosis of heart disease; inclusion criteria included competence in the English language and permanent residence in the US for at least 5 years.

All subjects completed a background questionnaire, the Dispositional Resilience Scale-15 (DRS-15; Bartone, 1999) and the Short Form 36 Medical Outcomes Survey (SF-36; Ware & Sherbourne, 1992). All subjects provided written informed consent and the research was approved by the Institutional Review Boards at the Naval Health Research Center, San Diego, CA (Sample 1) and Naval Aerospace Medical Research Laboratory, Pensacola, FL (Sample 2).

Table 1 Subject characteristics

Characteristic	Sample 1		Sample 2		Combined sample	
	N (%)	Mean ± SD	N (%)	Mean ± SD	N (%)	Mean ± SD
Age (years)	65	25.0 ± 3.8	55	23.8 ± 2.3	120	24.5 ± 3.3
Body mass index (kg/m^2)	65	25.5 ± 2.5	55	25.0 ± 2.7	120	25.3 ± 2.6
Years of military service	65	3.9 ± 3.4	55	2.0 ± 2.6	120	3.0 ± 3.2
Education						
High school graduate	22 (33.8%)		1 (1.9%)		23 (19.1%)	
College graduate	43 (66.2%)		53 (98.1%)		96 (80.0%)	
Missing	0 (0.0%)		1 (1.9%)		1 (0.8%)	
Ethnicity						
Caucasian	51 (81.0%)		45 (81.8%)		96 (80.0%)	
Latin/hispanic	8 (12.3%)		0 (0.0%)		8 (6.7%)	
African American	3 (4.6%)		2 (3.6%)		5 (4.2%)	
Asian American	0 (0.0%)		1 (1.8%)		1 (0.8%)	
Mixed ethnicity	1 (1.5%)		2 (3.6%)		3 (2.5%)	
Pacific islander	0 (0.0%)		2 (3.6%)		2 (1.7%)	
Other	0 (0.0%)		1 (1.8%)		1 (0.8%)	
Missing	2 (3.1%)		2 (3.6%)		4 (3.3%)	
Dispositional resilience						
Challenge	65	7.9 ± 2.5	55	7.7 ± 2.1	120	7.8 ± 2.3
Commitment	65	13.4 ± 2.3	55	14.1 ± 2.4	120	13.7 ± 2.3
Control	65	10.7 ± 1.7	55	11.5 ± 1.8	120	11.1 ± 1.8
Total	65	32.0 ± 4.4	55	33.3 ± 4.8	120	32.6 ± 4.6
Mental health	65	78.3 ± 5.1	55	83.7 ± 7.2	120	80.8 ± 6.7
Physical health	65	86.8 ± 5.8	55	89.8 ± 5.6	120	88.1 ± 5.9

Measures

Background questionnaire

This questionnaire assesses basic background and demographic information with both continuous (e.g., age, years of military service) and categorical demographic variables (e.g., ethnicity, military occupational specialty).

Dispositional Resilience Scale-15 (DRS-15; Bartone, 1999)

This 15-item scale includes positively and negatively keyed items and covers the three conceptually relevant facets of commitment, control, and challenge, designed for US populations. Cronbach's alpha coefficient in the present sample was 0.75. Acceptable test–retest reliability has been demonstrated for this scale (Pearson correlation coefficient 0.78; Bartone, 2007). Mean ± SD DRS-15 score in the total (combined) sample was 32.6 ± 4.6, which is nearly identical to a previously-studied, older cohort of military men (N = 28, mean ± SD DRS-15 score 32.6 ± 5.1, mean ± SD age 31.4 ± 7.4 years) (Taylor, unpublished data) and slightly higher than a sample of Norwegian cadets of similar age (Mean ± SD Norwegian-translated version of DRS-15 = 30.5 ± 4.2, mean ± SD age 24.8 ± 3.9 years) (Eid & Morgan, 2006).

Short form 36 (SF-36; Ware & Sherbourne, 1992)

The SF-36 is a multi-purpose, short-form health survey. It has been used in surveys of general and specific populations, comparing the relative burden of diseases, and in differentiating the health benefits produced by a wide range of different treatments. Evidence for acceptable validity and reliability of the SF-36 has been documented in nearly 4,000 publications. Although the SF-36 was originally designed with 8 subscales, physical health and mental health summary scores have been constructed and validated (Ware, 2000) to manage the number of statistical comparisons without substantial loss of information.

Specifically, the SF-36 consists of 36 questions, 35 of which are converted into eight subscales: (1) Physical Functioning; 10 items that capture abilities to deal with the physical requirement of life, such as attending to personal needs, walking, and flexibility; (2) Role-Physical: four items evaluating the extent to which physical capabilities

limit activity; (3) Bodily Pain; two items evaluating the perceived amount of pain experienced during the previous 4 weeks and the extent to which that pain interfered with normal work activities; (4) General Health; five items measuring general health perception; (5) Vitality; four items evaluating energy and fatigue; (6) Social Functioning; two items comprising the extent and amount of time that physical health or emotional problems have interfered with family, friends, and other social interactions; (7) Role-Emotional; three items measuring the extent to which emotional factors have interfered with work or other activities; and (8) Mental Health; five items evaluating anxiety and depression symptoms. Hence, the scales are assessed on the basis of answers of two to ten multiple choice questions, from which a score between 0 and 100 is calculated, with a higher score indicating a better state of health.

The SF-36 subscales are then summarized into two dimensions. The first five comprise the "Physical Health" dimension while the last five form the "Mental Health" dimension. The scales Vitality and General Health are elements of both dimensions. Hence, each dimension includes three specific and two overlapping subscales. The SF-36 also includes a question about self-evaluation of change in health during the past year (reported health) that does not belong to either dimension. The scores of each dimension reflect the mean of their respective scale components. Mean ± SD MH and PH scores in the total sample were 80.8 ± 6.7 and 88.1 ± 5.9, respectively. Cronbach alpha reliabilities in the total sample were 0.83 for PH and 0.82 for MH.

Statistical analyses

Data were analyzed using SPSS software Version 18.0 (SPSS, Inc., Chicago, IL). Characteristics of the distributions for all independent and dependent variables were examined to determine if assumptions of normality were met (Leech et al., 2001). PH was slightly negatively skewed in the combined sample and in each individual sample, which led us to model the hypothesized associations using a squared transformation of this variable to approximate a normal distribution (Stuart-Hamilton, 2007). All descriptive and inferential statistical analyses (i.e., hypothesis tests) were performed on the combined sample and then were repeated for sample 1 and 2, respectively.

Descriptive analyses were conducted to summarize subject characteristics, after which the similarity of samples 1 and 2 were examined with independent samples *t* tests and χ^2 tests of independence. Associations between hardiness, MH, and PH were quantified using mediation analyses based on principles of Baron and Kenny's (1986) *causal steps approach*. In this analysis, a series of requirements must be met in order to suggest that a mediation effect has occurred: (1) the initial predictor is associated with the outcome (path c), (2) the initial predictor variable is associated with the proposed mediator (path a), (3) the mediator is associated with the endpoint of interest (path b), and finally (4) the initial predictor loses (or substantially diminishes) its effect on the endpoint once the mediator is added as a second predictor in a regression model (path c′). Following our hypothesis that MH mediates the association of hardiness to PH, hardiness was selected as the independent variable, PH as the dependent variable, and MH as the proposed mediator (See Fig. 1). Age, education, and years of military experience were included as covariates for each step. The mediation model for the total (combined) sample was then tested with an alternate statistical approach (Sobel test; Preacher & Hayes, 2004) which evaluates the significance of the indirect effect of the mediator by testing the null hypothesis of no difference between the total effect (path c) and the direct effect (path c′). This test was not repeated in sample 1 or 2 because it is not recommended in small samples

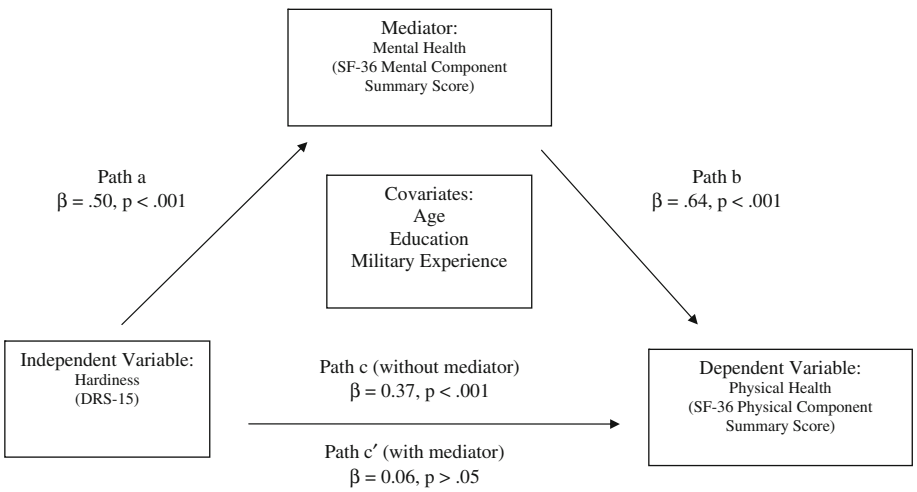

Fig. 1 Relationships between hardiness, mental health and physical health: evidence of mediated effects

(Preacher & Hayes, 2004). Also, the education variable was constant in sample 2 and therefore not covaried in this secondary analysis. All hypothesis tests were two-sided and the probability of committing a type I error was set at 0.05, although we reported when more stringent probabilities were achieved ($p < .01$ or $p < .001$).

Results

Sample 1 was slightly older ($t = 2.1$, $p < .05$) and possessed slightly more military experience ($t = 3.4$, $p < .01$) than subjects in Sample 2, yet endorsed somewhat lower MH ($t = -4.6$, $p < .001$) and PH ($t = -2.9$, $p < .01$). Sample 2 was more educated ($\chi^2 = 22.4$, $p < .001$), but the groups did not differ with respect to race [$\chi^2 = 0.5$, $p > .05$ (race was dichotomized for this analysis as "Caucasian" vs. "other")], BMI ($t = 0.9$, $p > .05$) or hardiness ($t = -1.6$, $p > .05$).

As outlined in requirements 1, 2, and 3 above, significant associations between the independent variable, the proposed mediator, and the dependent variable are necessary conditions to infer a mediated effect. In Fig. 1, the associations between hardiness, MH, and PH in the total sample were significant and the observed standardized beta weights imply at least low-moderate effects. These findings were replicated in both Sample 1 and Sample 2.

Tests of mediation

As shown in Fig. 1 (path c), hardiness predicted PH in the regression model performed on the total sample ($\beta = 0.37$, $p < .001$). However, when MH was added the direct effect of hardiness (path c′) on PH was substantially attenuated and no longer significant ($\beta = 0.06$, $p > .05$). MH also contributed significantly to the mediation model (path b) ($\beta = 0.64$, $p < .001$). The covariates (age, education and years of military experience) did not contribute significantly to any of the regression models. Adjusted R^2 values for the regression models testing paths a, b, c and c′ were 0.26, 0.40, 0.12, and 0.40, respectively. These results were replicated in samples 1 and 2. Standardized beta weights decreased (i.e., path c vs. path c′, reflecting addition of MH to the regression model) by 83.8, 79.4, and 84.6% for the total sample, sample 1 and sample 2, respectively. The Sobel test evaluating the hypothesized difference between the total effect (path c) and the direct effect (path c′) of hardiness on PH in the total sample was also significant (test statistic = 4.93, $p < .001$).

Discussion

Limited research examines path processes underlying resilience and health outcomes. To the best of our knowledge, this is the first study to delineate path processes between hardiness, MH, and PH in a military population. In particular, it was shown not only that hardiness positively associates with MH and PH, but also that MH mediates the relationship of hardiness to PH. Replication of these findings in separate, demographically-similar samples implies the stability of these relationships.

Hardiness was found to associate with both MH and PH, which resonates with a substantial literature linking these variables in various populations. As discussed earlier, hardiness influences a spectrum of health conditions and biomarkers such as blood pressure (Maddi, 1999) and immune status (Dolbier et al., 2001), as well as general illness symptoms across various occupational and socioeconomic groups (Dolbier et al., 2007; Hystad et al., 2011; Bartone, 1989). Hardiness has a mitigating role against chronic stress (DiBartolo & Soeken, 2003), chronic illness (Brooks, 2003), and aging (Smith et al., 2004). Several studies further specify an influence of hardiness on mental health indices in both military (Bartone, 1999; Eid & Morgan, 2006; Eid et al., 2004, Dolan & Adler, 2006) and civilian populations (Maddi, 1999). The current study is, to our knowledge, the first to link hardiness to broad, stable physical and mental health indices in military personnel during daily living.

These results further imply that MH mediates the association of hardiness to PH. Key theoretical models have been proposed to guide investigations of stress, strain, hardiness and aspects of mental and physical health, along with key mediators such as coping, social support, and adaptive health practices (Maddi, 1994; Maddi, 2007; Epel et al., 1998). These models, however, are in need of empirical testing, particularly with regard to mediated effects. Rigorous model testing is a crucial prerequisite to advance our understanding of complex relationships underlying hardiness and health outcomes. The present findings link hardiness to mental and physical health and further suggest that mental health connotes a pathway through which hardiness influences physical health. As alluded to earlier, hardiness likely influences physical health status via multiple aspects of mental health, such as subjective distress, coping/appraisal, burnout, health practices, and stress hormone profiles. Regarding the latter, it is well-known that stress leads to distinct physiological changes. Acute autonomic nervous system changes, for example, include innervation of the heart, blood vessels, and adrenal glands by activation of the sympathetic nervous system and hypothalamic–pituitary–adrenal (HPA) axis

(Mason, 1968). The stress hormone cortisol is a primary end product of HPA stimulation and is responsible for mobilizing blood glucose for energy and increasing blood pressure in support of the "fight or flight" response. Chronically high cortisol levels, however, can have adverse health consequences, such as hypertension (Herrada et al., 2011), Type 2 diabetes (Schmid et al., 2011) and metabolic syndrome (Stiefel et al., 2011). Integrated with the present findings, it is plausible that hardiness influences mental health via adaptive coping, health behaviors (diet, exercise, addiction), and/or stress appraisal; mental health in turn may influence physical health via stress system dysregulation leading to secondary effects on organ systems. Undoubtedly, relationships between stress, hardiness, and health indices are complex (and most likely bidirectional). More research establishing the interrelationships of these variables will not only strengthen our ability to explain and predict health outcomes (Epel et al., 1998), but will also fundamentally enhance prevention and treatment of a spectrum of diseases and disorders. Of particular relevance to the military population, hardiness may be a central determinant of the speed and efficiency of recovery from physical and mental injuries incurred during military service. In turn, hardiness training holds promise for influencing such outcomes; pre-deployment and/or early intervention training that incorporates hardiness education has the potential to buffer combat stress and posttraumatic stress disorder—two fundamental military health concerns (Hoge et al., 2004). Finally, hardiness should be considered in the development of tools and strategies to screen, assess and select military members for high stress occupations (Maddi, 2007).

Study limitations and strengths

This study has several limitations. Importantly, we relied solely on self-report which may have inflated the observed associations due to common method variance (Conway, 2002), although Spector (2006) concluded that this risk is typically overestimated. Also, we employed a cross-sectional design which must always be interpreted cautiously. Moreover, a modest sample size was studied, although it met the requirements set forth in Fritz and MacKinnon's (2007) report of necessary sample size to conduct tests of mediation. Future work with larger sample sizes will permit simultaneous assessment of multiple interacting variables using advanced statistical models. This study also lacked a measure of perceived stress and/or strain—an unfortunate limitation that we aim to rectify in subsequent studies. Inclusion of such data in future studies will permit more comprehensive tests of interrelationships of stress, strain, hardiness, and health (Maddi, 1994). At a minimum, it can be reasonably assumed that subjects in both samples were exposed to substantive occupational stress; subjects in the first sample were undergoing advanced pre-deployment training as part of their professional duties, while subjects in the second sample were awaiting assignment to military flight training. Finally, although this study provides unique insight into hardiness and health in military men, it obviously lacks generalizability to other populations. These limitations are counterbalanced by several strengths. Most notably, robustness of the observed relationships was evidenced in at least two ways: first, the hypothesized effects were supported in two separate, demographically-similar samples, thus offering a "built-in" indicator of reliability. Additionally, the observed mediated effects were supported by two conventional statistical approaches. Moreover, homogeneity within this sample permitted a priori control for several demographic covariates including sex, BMI, and race (age, education and military experience were controlled statistically).

This study offers empirical support for the hypothesis that MH mediates the influence of hardiness on PH in military men. Replication of these findings in separate, demographically-similar samples implies the stability of these relationships. Future studies will benefit from larger sample sizes, multivariable models, as well as tests of mediated and moderated effects. This study has implications for the design of evidence-based interventions (Maddi et al., 1998; Casey, 2011) to enhance mental and physical health of both military and civilian populations.

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